

What is claimed is:

1. A proton conducting material which is formed by crosslinking a unit structure of a layered clay mineral, wherein a polyvalent metal ion is incorporated between layers of said layered clay mineral.
2. The proton conducting material according to claim 1, wherein the unit structure of the layered clay mineral is crosslinked with a tetrafunctional alkoxide or a trifunctional alkoxide.
3. The proton conducting material according to claim 2, wherein the crosslinking tetrafunctional alkoxide or trifunctional alkoxide incorporates a strong acid group.
4. The proton conducting material according to claim 1, wherein a cationic surfactant is incorporated between layers of the layered clay mineral.
5. The proton conducting material according to claim 1 wherein the unit structure of the layered clay mineral is crosslinked with an alkoxide having a bulky functional group and small interaction.
6. The proton conducting material according to claim 1 wherein the unit structure of the layered clay mineral is crosslinked with bis-alkoxysilane.
7. The proton conducting material according to claim 1 wherein the unit structure of the layered clay mineral is crosslinked with an alkoxysilane having an epoxy ring.
8. A method for producing a proton conducting material which comprises the steps of: adding water to a layered clay mineral for obtaining a dispersed solution; adding a crosslinking agent to the dispersed solution for obtaining a developing liquid; developing the developing liquid on the substrate for obtaining a developing layer; heating and drying the developing

layer for obtaining a thin membrane; and immersing the thin membrane in an aqueous solution containing polyvalent ions, and drying.

9. A proton conducting thin membrane which comprises the proton conducting material according to claim 1.

10. A method for producing a proton conducting membrane which comprises the steps of: producing a proton conducting material according to the method according to claim 8; dissolving or dispersing the proton conducting material for preparing a solution or a sol; and gelating by the removal of solvent from the solution or sol.

11. A solid polymer fuel cell comprising a membrane electrode assembly (MEA) which comprises (a) a polymer solid electrolyte membrane; and (b) a gas diffusion electrode, which electrode couples with the electrolyte membrane and has as a main constituent material an electrode catalyst which comprises a conductive carrier that supports a catalytic metal and a proton conducting material, wherein the polymer solid electrolyte membrane and/or the proton conducting material is the proton conducting material according to claim 1 or proton conducting membrane according to claim 9.